

Round versus rectangular: Does the plot shape matter?

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Field rainfall simulators are designed to study soil erosion processes and provide urgently needed data for various geomorphological, hydrological and pedological issues. Due to the different conditions and technologies applied, there are several methodological aspects under review of the scientific community, particularly concerning design, procedures and conditions of measurement for infiltration, runoff and soil erosion.

Extensive discussions at the Rainfall Simulator Workshop 2011 in Trier and the Splinter Meeting at EGU 2013 “Rainfall simulation: Big steps forward!” lead to the opinion that the rectangular shape is the more suitable plot shape compared to the round plot. A horizontally edging Gerlach trough is installed for sample collection without forming unnatural necks as is found at round or triangle plots. Since most research groups did and currently do work with round plots at the point scale ($<1\text{m}^2$), a precise analysis of the differences between the output of round and square plots are necessary.

Our hypotheses are:

- Round plot shapes disturb surface runoff, unnatural fluvial dynamics for the given plot size such as pool development especially directly at the plot’s outlet occur.
- A square plot shape prevent these problems.

A first comparison between round and rectangular plots (Iserloh et al., 2015) indicates that the rectangular plot could indeed be the more suitable, but the rather ambiguous results make a more elaborate test setup necessary.

The laboratory test setup includes the two plot shapes (round, square), a standardised silty substrate and three inclinations (2° , 6° , 12°).

The analysis of the laboratory test provide results on the best performance concerning undisturbed surface runoff and soil/water sampling at the plot’s outlet.

The analysis of the plot shape concerning its influence on runoff and erosion shows that clear methodological standards are necessary in order to make rainfall simulation experiments comparable.

Reference:

Iserloh, T., Pegoraro, D., Schlösser, A., Thesing, H., Seeger, M., Ries, J.B. (2015): Rainfall simulation experiments: Influence of water temperature, water quality and plot design on soil erosion and runoff. Geophysical Research Abstracts, Vol. 17, EGU2015-5817.